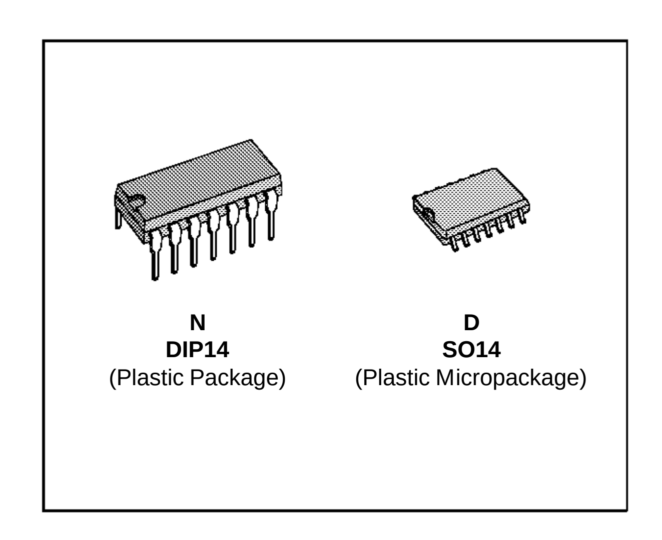


TS27L4C,I,M

VERY LOW POWER QUAD CMOS OPERATIONAL AMPLIFIERS

- EXCELLENT PHASE MARGIN ON CAPACITIVE LOADS
- SYMETRICAL OUTPUT CURRENTS
- LOW OUTPUT DYNAMIC IMPEDANCE
- THE TRANSFER FUNCTION IS LINEAR
- PIN TO PIN COMPATIBLE WITH STANDARD QUAD OP-AMPs (TL084 -LM324)
- STABLE AND LOW OFFSET VOLTAGE
- THREE INPUT OFFSET VOLTAGE SELECTIONS



ORDER CODES

Part Number	Temperature Range	Package	
		N	D
TS27L4C/AC/BC	0°C, +70°C	•	•
TS27L4I/AI/BI	-40°C, +125°C	•	•
TS27L4M/AM/BM	-55°C, +125°C	•	•
Example : TS27L4ACN			

27L4-01.TBL

DESCRIPTION

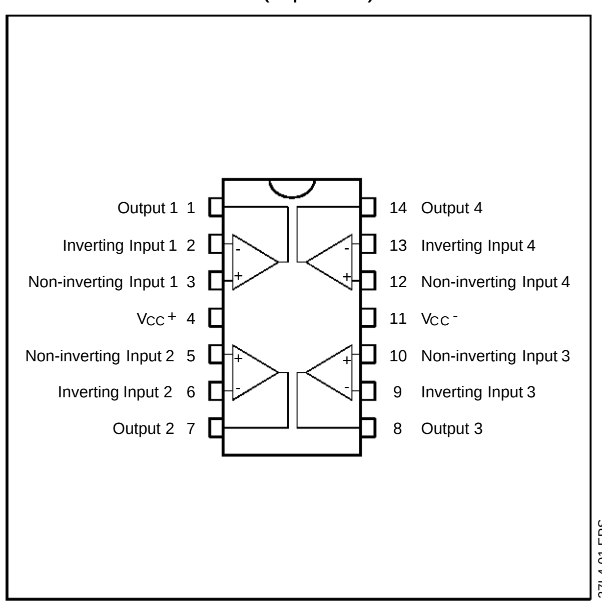
The TS274 series are low cost, low power quad operational amplifiers designed to operate with single or dual supplies. These operational amplifiers use the SGS-THOMSON silicon gate LIN MOS process giving them an excellent consumption-speed ratio. These series are ideally suited for low consumption applications.

Three power consumptions are available allowing to have always the best consumption-speed ratio :

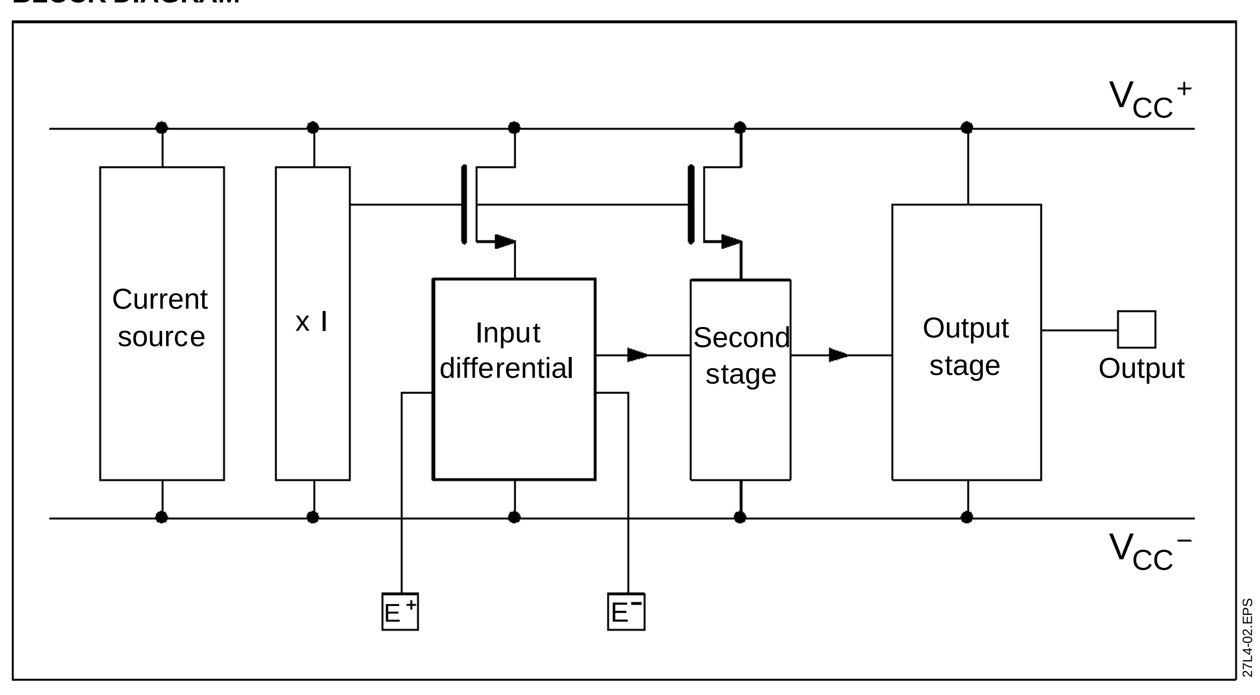
- I_{CC}= 10µA/amp. : TS27L4 (very low power)
- I_{CC}= 150µA/amp. : TS27M4 (low power)
- I_{CC}= 1mA/amp. : TS274 (high speed)

These CMOS amplifiers offer very high input impedance and extremely low input currents. The major advantage versus JFET devices is the very low input currents drift with temperature (see figure 2).

PIN CONNECTIONS (top view)



BLOCK DIAGRAM



MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}^{+}	Supply Voltage - (note 1)	18	V
V_{id}	Differential Input Voltage - (note 2)	±18	V
V_i	Input Voltage - (note 3)	-0.3 to 18	V
I_O	Output Current for $V_{CC}^{+} \geq 15V$	±30	mA
I_{in}	Input Current	±5	mA
T_{oper}	Operating Free-Air Temperature Range TS27L4C/AC/BC TS27L4I/AI/BI TS27L4M/AM/BM	 0 to +70 -40 to +125 -55 to +125	°C
T_{stg}	Storage Temperature Range	-65 to +150	°C

27L4-02.TBL

Notes : 1. All voltage values, except differential voltage, are with respect to network ground terminal.
2. Differential voltages are at the non-inverting input terminal with respect to the inverting input terminal.
3. The magnitude of the input and the output voltages must never exceed the magnitude of the positive supply voltage.

OPERATING CONDITIONS

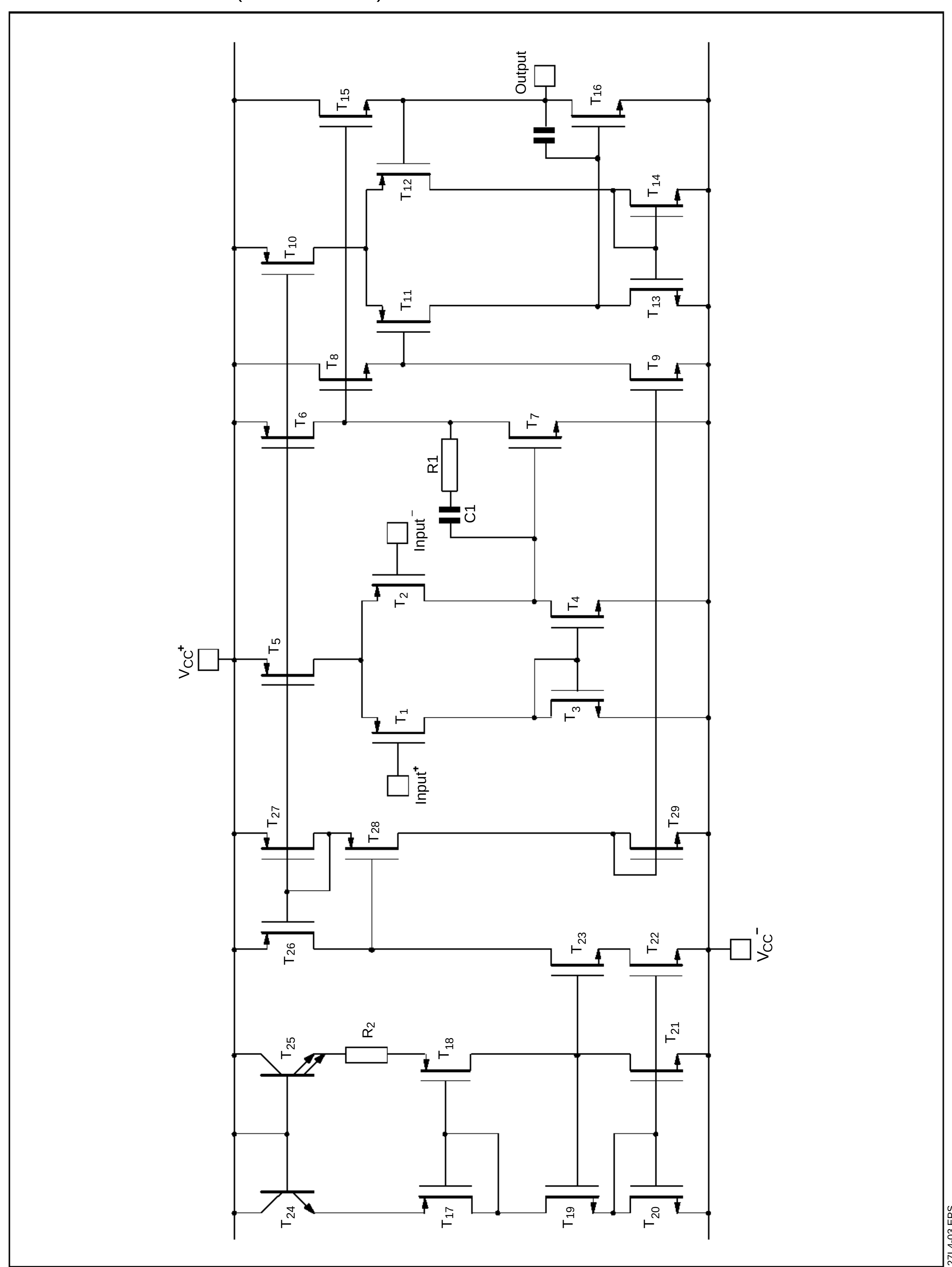
Symbol	Parameter	Value	Unit
V_{CC}^{+}	Supply Voltage	3 * to 16	V
V_{icm}	Common Mode Input Voltage Range	0 to V_{CC}^{+} - 1.5	V

27L4-03.TBL

* Selected devices only.



SCHEMATIC DIAGRAM (for 1/4 TS27L4)



ELECTRICAL CHARACTERISTICS

V_{CC}^{+} = +10V, V_{CC}^{-} = 0V, T_{amb} = 25°C (unless otherwise specified)

Symbol	Parameter	TS27L4C/AC/BC			TS27L4I/AI/BI TS27L4M/AM/BM			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V_{io}	Input Offset Voltage V_O = 1.4V, V_{ic} = 0V TS27L4C/I/M TS27L4AC/AI/AM TS27L4BC/BI/BM $T_{min.} \leq T_{amb} \leq T_{max.}$ TS27L4C/I/M TS27L4AC/AI/AM TS27L4BC/BI/BM		 1.1 0.9 0.25	 10 5 2 12 6.5 3		 1.1 0.9 0.25	 10 5 2 12 6.5 3.5	mV
DV_{io}	Input Offset Voltage Drift		0.7			0.7		µV/°C
I_{io}	Input Offset Current - (note 1) V_{ic} = 5V, V_o = 5V $T_{min.} \leq T_{amb} \leq T_{max.}$		 1	 100		 1	 200	pA
I_{ib}	Input Bias Current - (note 1) V_{ic} = 5V, V_o = 5V $T_{min.} \leq T_{amb} \leq T_{max.}$		 1	 150		 1	 300	pA
V_{OH}	High Level Output Voltage V_{id} = 100mV, R_L = 1MΩ $T_{min.} \leq T_{amb} \leq T_{max.}$	 8.8 8.7	 9		 8.8 8.6	 9		V
V_{OL}	Low Level Output Voltage V_{id} = -100mV			 50			 50	mV
A_{vd}	Large Signal Voltage Gain V_o = 1V to 6V, R_L = 1MΩ, V_{ic} = 5V $T_{min.} \leq T_{amb} \leq T_{max.}$	 60 45	 100		 60 40	 100		V/mV
GBP	Gain Bandwidth Product A_v = 40dB, R_L = 1MΩ, C_L = 100pF f_{in} = 10kHz		 0.1			 0.1		MHz
CMR	Common Mode Rejection Ratio V_o = 1.4V, V_{ic} = 1V to 7.4V	 65	 80		 65	 80		dB
SVR	Supply Voltage Rejection Ratio V_{CC}^{+} = 5V to 10V ,V_o = 1.4V	 60	 80		 60	 80		dB
I_{CC}	Supply Current (per amplifier) A_v = 1, no load, V_o = 5V $T_{min.} \leq T_{amb} \leq T_{max.}$		 10	 15 17		 10	 15 18	µA
I_o	Output Short Circuit Current V_{id} = 100mV, V_o = 0V		 60			 60		mA
I_{sink}	Output Sink Current V_{id} = -100mV, V_o = V_{CC}		 45			 45		mA
SR	Slew-Rate at Unity Gain R_L = 1MΩ, C_L= 100pF, V_i = 3 to 7V		 0.04			 0.04		V/µs
∅m	Phase Margin at Unity Gain A_v = 40dB, R_L = 1MΩ, C_L= 100pF		 45			 45		Degrees
K_{ov}	Overshoot Factor		30			30		%
e_n	Equivalent Input Noise Voltage f = 1kHz, R_S = 100Ω		 68			 68		$\frac{nV}{\sqrt{Hz}}$
V_{O1}/V_{O2}	Channel Separation		120			120		dB

27L4-04.TBL

Note : 1. Maximum values including unavoidable inaccuracies of the industrial test.

TYPICAL CHARACTERISTICS

Figure 1 : Supply Current (each amplifier) versus Supply Voltage

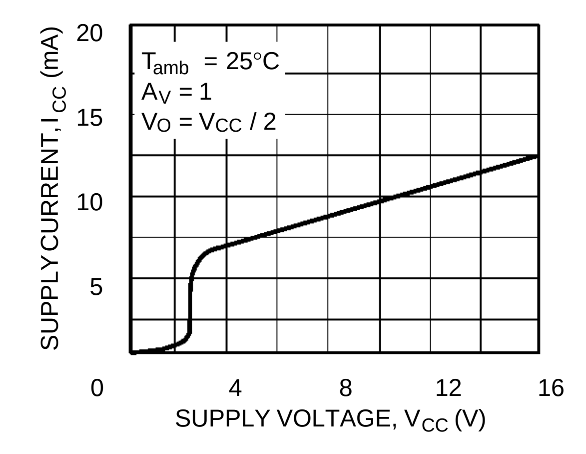


Figure 2 : Input Bias Current versus Free Air Temperature

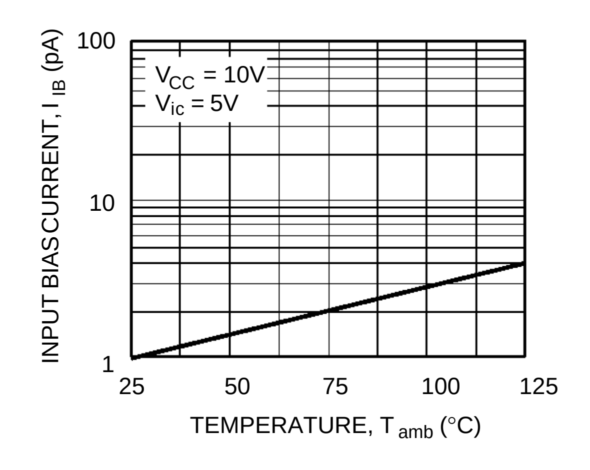


Figure 3a : High Level Output Voltage versus High Level Output Current

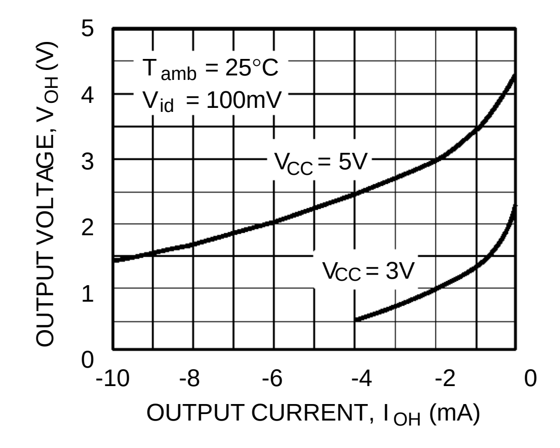


Figure 3b : IHigh Level Output Voltage versus High Level Output Current

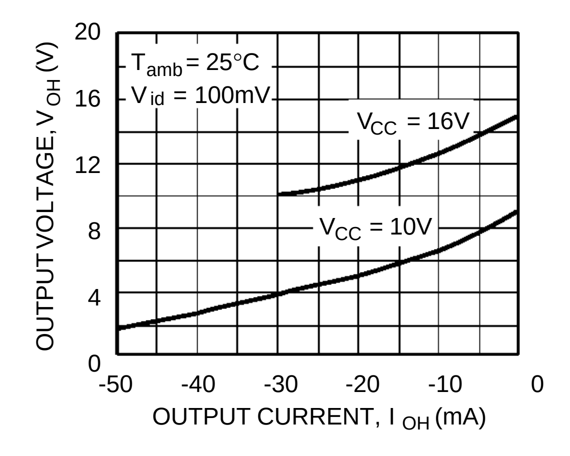


Figure 4a : Low Level Output Voltage versus Low Level Output Current

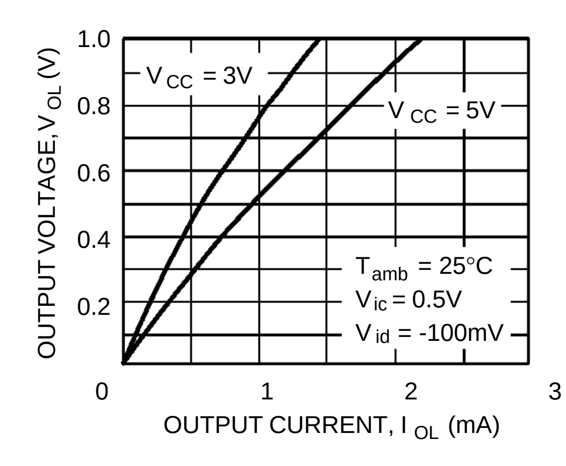
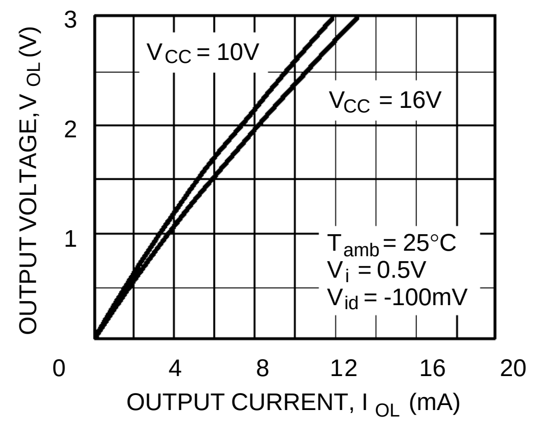


Figure 4b : Low Level Output Voltage versus Low Level Output Current



TYPICAL CHARACTERISTICS (continued)

Figure 5 : Open Loop Frequency Response and Phase Shift

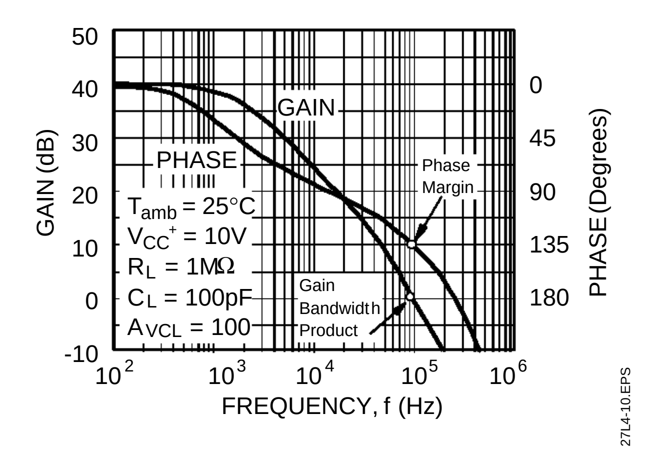


Figure 6 : Gain Baindwidth Product versus Supply Voltage

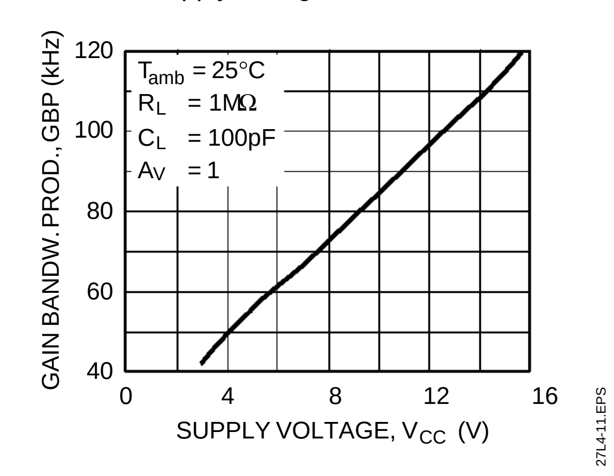


Figure 7 : Phase Margin versus Supply Voltage

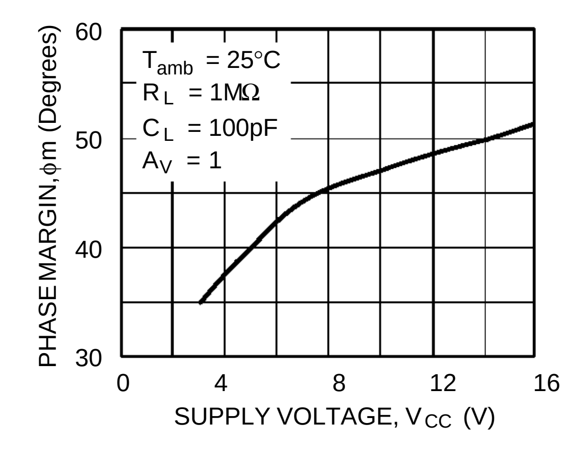


Figure 8 : Phase Margin versus Capacitive Load

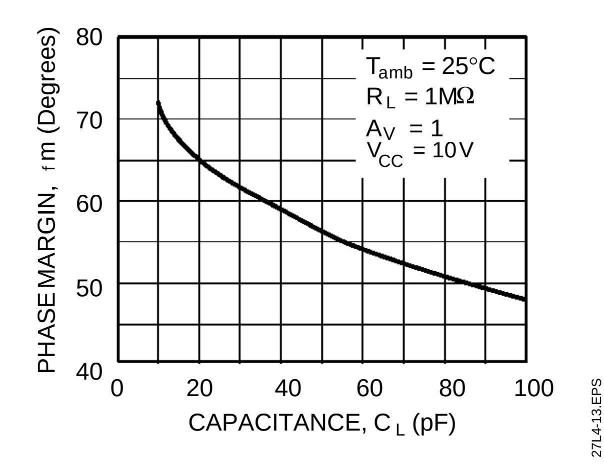


Figure 9 : Slew Rates versus Supply Voltage

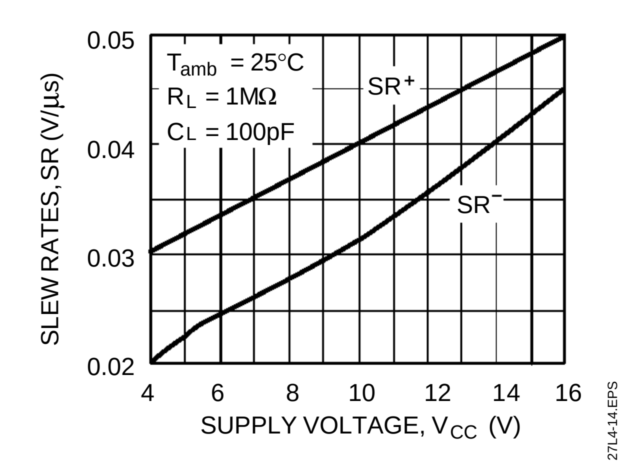
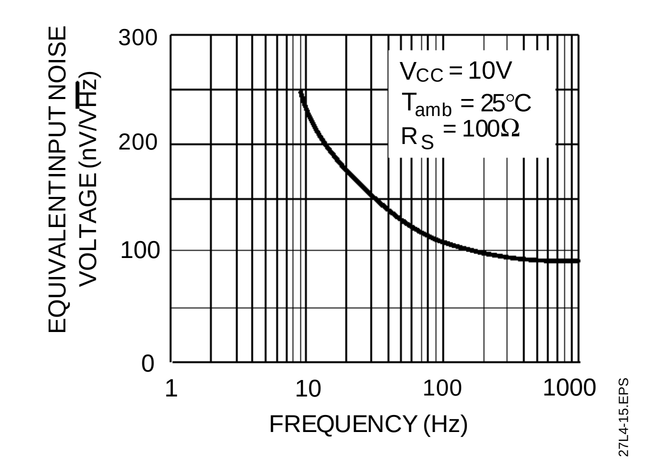
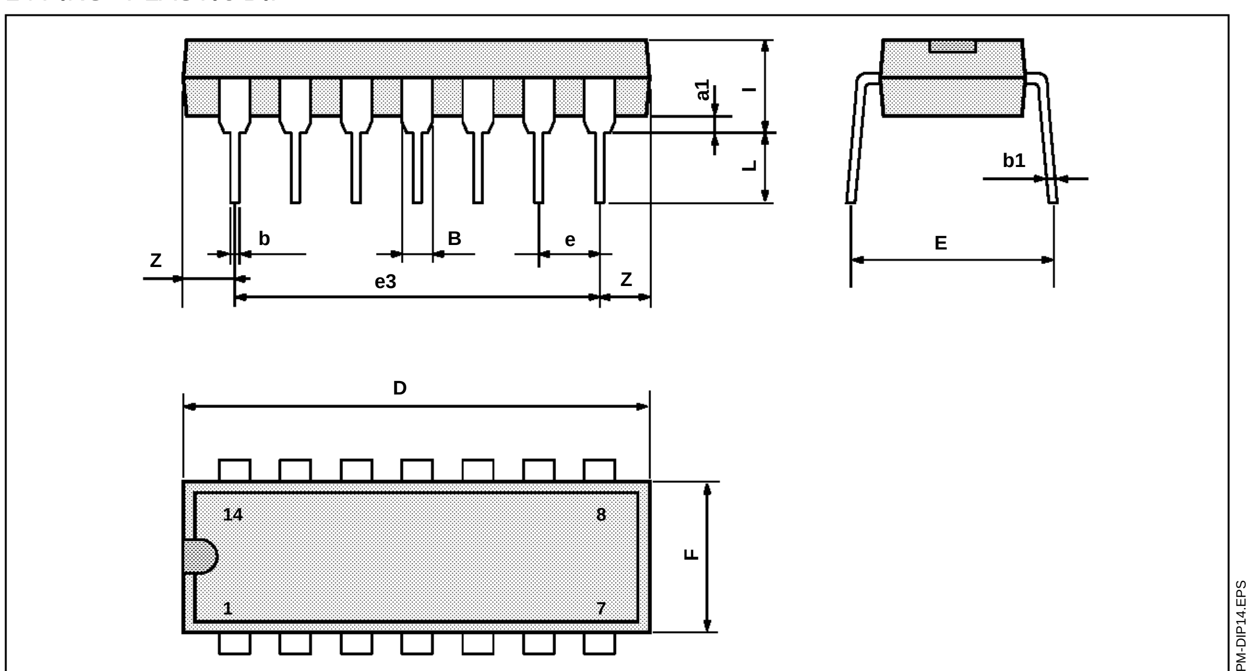


Figure 10 : Input Voltage Noise versus Frequency



PACKAGE MECHANICAL DATA

14 PINS - PLASTIC DIP

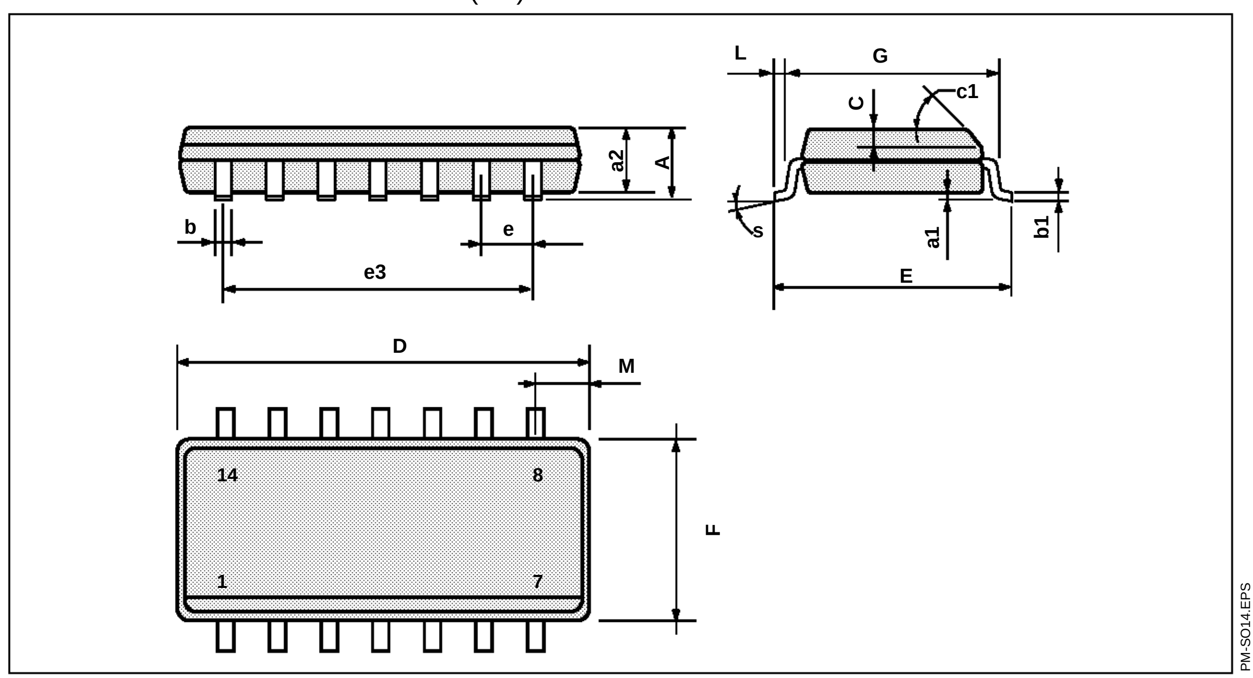


Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
a1	0.51			0.020		
B	1.39		1.65	0.055		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		15.24			0.600	
F			7.1			0.280
i			5.1			0.201
L		3.3			0.130	
Z	1.27		2.54	0.050		0.100

DIP14.TBL

PACKAGE MECHANICAL DATA

14 PINS - PLASTIC MICROPACKAGE (SO)



PM-SO14.EPS

Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.069
a1	0.1		0.2	0.004		0.008
a2			1.6			0.063
b	0.35		0.46	0.014		0.018
b1	0.19		0.25	0.007		0.010
C		0.5			0.020	
c1	45^{o} (typ.)					
D	8.55		8.75	0.336		0.334
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		7.62			0.300	
F	3.8		4.0	0.150		0.157
G	4.6		5.3	0.181		0.208
L	0.5		1.27	0.020		0.050
M			0.68			0.027
S	8^{o} (max.)					

SO14.TBL

ORDER CODE :